# BROTHERHOOD OF LOCOMOTIVE ENGINEERS AND TRAINMEN

*A DIVISION OF THE RAIL CONFERENCE*
*INTERNATIONAL BROTHERHOOD OF TEAMSTERS*

## SAFETY TASK FORCE

**INDEPENDENCE, OHIO**

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**BEFORE THE NATIONAL TRANSPORTATION SAFETY BOARD**

**NTSB Accident Number: RRD-18MR001**

**Class: MAJOR**
**December 18, 2017**

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**Proposed findings, probable cause, and safety recommendations in connection with the derailment of Amtrak Train No. 501, on December 18, 2017 near DuPont, Washington.**

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Stephen J. Bruno, BLET-Safety Task Force, National Chairman
Scott G. Palmer, BLET-Safety Task Force, Party Spokesman

**FINAL SUBMISSION**

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## Accident Synopsis

On December 18, 2017 at 7:33 a.m. Pacific Standard Time[1], National Railroad Passenger Corporation ("Amtrak") Train No. 501 derailed on an overpass while travelling at 78 miles per hour ("MPH"). The derailment occurred at Milepost ("MP") 19.8 in a permanent 30 MPH curve on Sound Transit's Lakewood Subdivision. The derailment sent the lead locomotive WDTX 1402, the Head End Power car and two (2) passenger coaches off the railroad overpass and onto the southbound lanes of Interstate 5 near DuPont, Washington. The eight (8) remaining passenger coaches, one (1) baggage car and rear locomotive came to rest in a wooded ravine, on the bridge and on the track leading up to the bridge respectively. There were three (3) fatalities and sixty-two (62) injured passengers on Amtrak Train No. 501. There were eight (8) motorist's injured.

[1] All times throughout this report will be shown as Pacific Standard Time.

## Train Information

The train consisted of fourteen (14) pieces of rolling stock: lead locomotive WDTX 1402; a Head End Power car (to provide electricity to the coaches); ten (10) Talgo passenger coaches; one (1) baggage car; and the rear locomotive, AMTK 181. The train was 651 feet in length and weighed 462 tons.

Crew members included the Locomotive Engineer and a qualifying Conductor on the lead locomotive, a Conductor, Lead Service Attendant, and Lead Service Attendant-trainee on the train. Also a, Talgo technician was on board, but was not performing service as a member of the crew.

## Accident Narrative

The crew of Amtrak Train No. 501, went on duty December 18, 2017 at 6:00 a.m., to operate the train's inaugural run between Seattle's King Street Station and Portland, Oregon, over the newly refurbished Lakewood Subdivision. The crew boarded the train at Amtrak's Holgate Street facility in Seattle and, after a delay for an unrelated mechanical issue, proceeded to King Street Station to receive passengers.

The Lakewood Subdivision is notable for its steep grades at the beginning and the end of the 20.6-mile line. The trip proceeded normally until Train No. 501 began descending the steep grade approaching the 30 MPH curve at MP 19.8. Despite an advance warning sign two (2) miles from where the speed restriction began, the crew of Train No. 501 did not take any action to slow the train until forty (40) seconds before the derailment. Two (2) brake pipe reductions were made prior to the derailment at a deliberate service rate. Event Recorder data reflected at 07:33:22 the brake pipe ("BP") pressure was reduced from 110 to 102 pounds ("lbs.") (8 pound reduction), then at 07:33:48 the BP pressure was further reduced to 91 lbs. for a total brake pipe reduction of 19 lbs. and a 47- 48 lb. brake cylinder application.[2]

[2] Air braking forces in trains are caused by increases in the brake cylinder pressure. The brake cylinder pressure is increased by reductions in the brake pipe pressure. When brake pipe pressure is reduced by 1 lb a corresponding increase of 2.5 lbs occurs in the brake cylinder pressure. In this accident the 19 lb brake pipe reduction should have created a 47.5 lb brake cylinder application of the brakes. With this equipment, a full service application of the brakes can produce approximately 72 lbs of brake cylinder pressure. The locomotive engineer's brake pipe reductions resulted in 2/3 of the trains air braking forces being applied.

The initial reduction was in response to an over speed alarm on the Charger (WDTX 1402) lead locomotive.[3] The second reduction to 91 lbs. (20 seconds later) provided the train with 66% of its maximum air braking force. There is no evidence of the dynamic brake being used or that an emergency application of the brakes was initiated by crewmembers.

The two (2) brake pipe reductions caused a decrease in speed from 83 to 78 MPH. However, the severe grade of the track combined with the late brake application could not bring the train to the required speed in sufficient time. The train entered the 7½° left-hand curve above Interstate 5("I-5") at 78 MPH, where the speed is restricted to 30 MPH. The facts that additional service braking was available but not used, the dynamic brake was not utilized and the trains' emergency brakes were not activated supports the conclusion that the locomotive engineer did not realize his location in relation to the 30 MPH curve until it was too late.

The lead locomotive and the following seven (7) pieces of rolling stock, including six (6) passenger cars, left the track, became airborne, and traveled down a wooded embankment, some reaching and blocking the southbound lanes of I-5. The remaining four (4) coaches and one (1) baggage car came to rest on the overpass. The trailing unit (AMTK 181) remained on the rail just short of the overpass.

## Lakewood Subdivision

The Lakewood Subdivision is a 20.6 mile segment of main line owned by Sound Transit, extending from TR Junction (MP 0.7) in Tacoma to Burlington Northern Santa Fe's ("BNSF's") Nisqually Junction (MP 21.3). The rail line had seen little use for decades, until Sound Transit purchased it from BNSF. Sound Transit began commuter service operations between Lakewood (MP 10.1) and Seattle, Washington, contracting with BNSF to provide crews to operate the trains. The Lakewood Subdivision was chosen to permanently divert Amtrak trains between Tacoma and Nisqually, Washington, decreasing running time slightly and avoiding congestion in the Point Defiance area of the BNSF Seattle Subdivision. Centralized Traffic Control ("CTC") authorizes train

[3] Per part of the Locomotive Engineer's testimony (recollection) p.43, lines 22-25 and p.44, line 1, substantiated by the download data off the WDTX 1402 locomotive.

movements by signal indication and is controlled by BNSF's Centralia North Dispatcher. Positive Train Control ("PTC") was not operational on the date of the accident.

While BNSF crews operate Sound Transit commuter trains from Seattle to Lakewood, they do not operate south of Lakewood. Tacoma Rail operates on the Lakewood Subdivision between Lakewood and Nisqually Junction, providing switching service to freight customers. Tacoma Rail does not operate north of Lakewood.

Prior to the inaugural trip, Sound Transit issued Sounder Commuter Rail Timetable #2, in effect at 0001 on November 13, 2017. The timetable contains various speed restrictions and specific instructions for both freight, Talgo (Amtrak) and Sound Transit trains operating over the Lakewood Sub.[4] Sound Transit sought the assistance of the BNSF Northwest Division to create a timetable specifically to incorporate Talgo speeds on the Lakewood Subdivision[5].

Freight operations are conducted at considerably slower speeds than Sound Transit or Amtrak operations. As an example, from MP 18.9 to MP 19.8, (the derailment site), Amtrak's Talgo equipment is authorized to operate at 79 MPH, southward, while freight trains are limited to 10 MPH. Southward speeds at the curve at MP 19.8 are 30 MPH and 10 MPH, respectively.

Amtrak the only entity that operates the full length of the Subdivision, yet was not given the opportunity to review the Sounder Timetable prior to it becoming effective.

## Fixing America's Surface Transportation Act of 2015 ("FAST Act"):

Additionally, BNSF and Sound Transit identified an area that triggered Fixing America's Surface Transportation Act of 2015 ("FAST Act") requirements[6]. Pursuant to the Act Sound Transit published timetable instructions, that require the Conductor to notify the Locomotive Engineer not less than one (1) mile from an area where a reduction of speed of more than 20 MPH takes effect. Further, the timetable requires the Conductor to take appropriate action to ensure the safe operation of the train if the Locomotive Engineer fails to acknowledge the restriction.[7] The only area

[4] *See* Attachment A at the end of this report.

[5] See interview Sound Transit Lakewood Subdivision Rail Activation Team Page 26, Lines 10-22.

[6] See Pub. L. 11406, § 11406, 129 STAT.4 683–4684..

[7] See Attachment B at the end of this report.

that BNSF and Sound Transit identified as a FAST Act requirement is at MP 3.4, northbound, where the speed drops by 40 MPH from 75 to 35 MPH for Talgo equipment. Created by BNSF and approved by Sound Transit, this only applies to Sounder passenger trains and not Amtrak Talgo equipment. There are no FAST Act communication requirements for Amtrak on any portion of the Lakewood Subdivision.

There are no FAST Act communication requirements in the timetable for any southbound passenger trains at the accident site. The Talgo operating speeds drop 49 MPH from 79 to 30 MPH at MP 19.8. Therefore, this speed reduction should likewise require FAST Act communication requirements, but such requirements were not included in the timetable. The omission of this operational safety requirement is a significant factor in this incident.

## Lack of Signage on the Lakewood Subdivision:

BNSF System Special Instructions, which are in effect for the Lakewood Subdivision, contain examples of various approved roadway signs. One of these, a *Crest of Grade* sign, a black triangle on a yellow reflective background, the sole purpose of which is to be displayed at areas where a steep or notable descending grade begins as a safety reminder for Locomotive Engineers. No such signs were placed at the two descending grades, at MP 3.4 northward and MP 19 southward. Without such a reminder, it falls to the Engineer's territorial familiarity and memory to determine where the steep descent begins. The absence of this operational safety reminder is a contributing factor in this accident.

**"Crest of Grade" marker as described in Burlington Northern Santa Fe's System Special Instruction No. 8, October 4, 2017.**

## Training and Qualification Procedures for the Lakewood Subdivision:

The Lakewood Subdivision received extensive refurbishment and Amtrak began signal testing the track in January of 2017. As this was new and unfamiliar track, Amtrak train crews began quali-

fying over the territory in mid-November, 2017, operating trains back and forth between TR Junction and Nisqually Junction. Between Nisqually and Lakewood, Amtrak managers qualified with Tacoma Rail crews on freight trains and at freight speed which are significantly lower than Talgo speeds, as described above. Once Amtrak managers deemed themselves qualified over the territory, they began training Locomotive Engineers en-masse. These "qualifying trips" were all performed during a ten (10) day period and all at night, due to ongoing line construction and Sound Transit's commuter schedule during daylight hours. Amtrak managers required Locomotive Engineers to operate only one (1) round trip over the Subdivision in order to qualify.

Interviews conducted with Amtrak supervisors and employees revealed that at times there could be five (5) or more Locomotive Engineers crowded into the lead locomotive at the same time, theoretically "observing" while one (1) Locomotive Engineer qualified by operating the controls. Other Locomotive Engineers rode the trailing locomotive, "observing in reverse" until it was their turn to either observe or operate the train, in the lead locomotive.

The physical characteristics qualification process described above is not consistent with the manner in which Amtrak locomotive engineers typically achieve territorial qualification on unfamiliar territory. To the contrary, whenever possible, locomotive engineers are assigned to an Amtrak Designated Instructor Engineer, qualified on the territory, who will share necessary information, (i.e.) control points, signal locations, curves and track grades, dispatcher authority, permanent and temporary speed restrictions, operating rules and instructions in effect, landmarks for proper braking distances, in order for the qualifying locomotive engineer to gain a thorough and comprehensive understanding and familiarization of the territory being learned. Furthermore, after being formally examined and tested on applicable operating rules and instructions pertinent to the territory, and demonstrating an overall general knowledge of same to the observing Instructor Engineer, qualifying locomotive engineers are also provided ample opportunity to actually operate over the territory under the guidance and supervision of the Instructor Engineer. Clearly, in this instance, it does not appear that type of process was afforded to Amtrak locomotive engineers qualifying on the physical characteristics of the Lakewood Subdivision prior to the inauguration of service.

In circumstances involving new railroad or territory where neither Amtrak supervision or the locomotive engineer workforce are qualified to operate, Amtrak typically reaches out to the host Carrier or tenant of the subject territory for the purpose of having one or more Amtrak Designated Supervisors of Locomotive Engineers ("DSLE") become territorially qualified under the guidance of that Carrier. In turn, when the DSLE(s) become fully qualified, they act as Instructor Engineers to locomotive engineers requiring physical characteristic qualification instructions. However, in this particular instance that process was not followed due to the fact that Sound Transit only provided a minimal window of opportunity for locomotive engineers and management to gain basic familiarization of the territory.

The Amtrak Road Foreman stated in interviews that Amtrak does not have a minimum requirement for qualifying runs for locomotive Engineers. [8] The Amtrak Road Foreman who qualified the locomotive engineer of Train 501 and others, identified Control Point ("CP") 188 to all qualifying Passenger Engineers as a landmark to begin slowing for the curve at MP 19.8.[9] CP 188 is a silver metal box or *bungalow* with a Centralized Traffic Control ("CTC") signal and a reflective sign reading "CP 188."[10] This was one of two possible landmarks offered by the Road Foreman as a spot to begin slowing for the 30 MPH curve at MP 19.8 but the only one the locomotive engineer of Train No. 501 would have been looking for on December 18, 2017.[11],[12]

The territorial qualification process delivered by Amtrak certainly does not appear to have provided qualifying locomotive engineers with sufficient opportunity to acquire a meaningful understanding and full comprehension of the involved territory on the Lakewood Subdivision. Instead, the qualification instructions delivered merely offered a hurried and cursory general familiarization of the Subdivision overall. It is highly doubtful the minimalistic qualification opportunity of one (1) night of observation and one (1) hands on round trip operation effectively afforded locomotive engineers with the requisite physical characteristic qualification required to operate trains

[8] See interview Bradasich, page 28, lines 10-12.

[9] See interview Bradasich, page 16, lines 3-13.

[10] Centralized Traffic Control (or CTC) allows a single dispatcher to directly control and monitor a long section of railroad, often a whole Subdivision.

[11] See interview Brown, page 43, lines 12-25.

[12] Territorial familiarization is a process by which a Locomotive Engineer and/or Conductor becomes acquainted with the nuances of the track, grade, signals, and other physical characteristics of the railroad right of way by direct observation.

over this territory safely. This minimal level of critical training is inconsistent with best practices and common industry standards.

Additionally, when reviewing the manner and substance of the physical characteristic qualification process it is noteworthy to mention that in the aftermath of the accident Amtrak contacted the BLET Amtrak General Chairman to request BLET's input in developing Route Qualification Standards for the Amtrak system. Having long been a priority in moving to undertake such a project, BLET fully welcomed the opportunity to participate as requested and vowed to offer every assistance possible and necessary. Unfortunately, no further contact was made with BLET in that regard. Instead, Amtrak unilaterally developed the standards referenced above absent any BLET input and finally provided notice to the BLET following testimony before the NTSB on July 10 and 11, 2018 in Washington, D.C.

Amtrak Conductors, who required one (1) trip on the lead locomotive to observe the Lakewood Subdivision in order to qualify, were not permitted to observe from the lead locomotive due to the press of bodies in the cab compartment. Those who requested were refused.[13] Conductors were instructed to ride in the coaches or in the trailing locomotive to attain their territorial familiarization. Amtrak did not provide a manager to conductors to answer any questions about the territory they might have had.[14] A ten (10) question physical characteristics test was given to locomotive engineers and a six (6) question test to Conductors in order to complete qualification.

It is evident that Amtrak managers do not fully understand the difference between a locomotive engineer being qualified on a territory and being familiar with a territory. This resulted in employees who were "qualified" on paper but unfamiliar with the territory over which they were assigned to operate.

[13] See Amtrak Train No. 501 Conductor Lingafelter interview pages 24, 25 and 26, lines 20-25, 23-25, and 1-17 respectively.

[14] See Amtrak Train No. 501 Conductor Lingafelter interview pages 30-32, lines 24-25, 1-25, 1-9 respectively.

## Post-Accident Sight Distance Testing:

During sight-distance tests over the territory in January 2018, Amtrak provided a similar trainset with a qualified locomotive engineer and conductor. In the pre-dawn hours, and again after sun-rise, the test train travelled over the territory from MP 17 to MP 19.8, observing signs, signals, and landmarks. It was noted by parties present during the sight-distance testing, that the "qualified" conductor on that test train had still never had a qualifying trip in the lead locomotive, and was unaware that the 30 MPH speed restriction at MP 19.8 met FAST Act criteria. Also, the 30 MPH speed restriction at the curve at MP 19.8 was still not listed in the Sound Transit Timetable or in Amtrak General Orders as a FAST Act location. The locomotive engineer stopped twice due to an unfamiliar alarm or condition with the Charger locomotive, and mistook landmarks at least twice while parties from the group observed operations from the lead locomotive. The conditions that led to the fatal accident on December 18, 2017 were still present and had not been corrected.

## Qualification and familiarization

The Lakewood Subdivision is remarkable for its steep grades at the beginning and the end of the route. The locomotive engineer of Train No. 501 had one (1) familiarization trip at the controls southward, in the direction of the inaugural day run. The prominent physical characteristic feature in that direction is the steep descending grade beginning at approximately MP 19 and ending at MP 21, near Nisqually Junction.

At the maximum authorized speed of 79 MPH a train travels one (1) mile every forty-five (45) seconds. Thus, from the beginning of the descent at MP 19 to MP 19.8 where the 30 MPH speed restriction was in effect — eight-tenths of a mile — the running time would be roughly forty (40) seconds. Assuming a qualifying train trip slowed to the required 30 MPH, the running time would be between 120 and 180 seconds as noted during the simulation ride.

Therefore, the locomotive engineer had, at most, a total of 180 seconds of throttle experience over the area where Amtrak managers noted the omission of MP 19.8 from the FAST Act requirements. The process of slowing a train from 79 MPH to 30 MPH on a heavy descending grade requires a great deal of concentration and timing to accomplish safely. The timing comes from observing landmarks, judging closing speed, and above all, knowing where one is with certainty.

During interviews about the training the locomotive engineer of Train No. 501 received on the Charger unit, he stated, "I wouldn't have run the l if I didn't feel comfortable with it," yet he later testified that "I was concerned finding out that it was going to be a Charger locomotive and I wanted some time to familiarize myself with the locomotive...". He also stated that the run was straight-forward, he was comfortable on the territory and knew where the curve was. He stated that "I wouldn't have gotten behind the throttle if I wasn't comfortable with it."[15] He went on to say twice in testimony that he knew he was getting close to the curve when he passed MP 15.5, which was the last railroad grade crossing before the curve, which is not correct.

The last crossing-at-grade is Barksdale Avenue, located at MP 17.4. Meaning the locomotive engineer was two (2) miles closer to the speed restriction than he thought he was.[16] This is consistent with the conclusion that the locomotive engineer misunderstood the train's position on the territory. The locomotive engineers throttle actions reflected what would be consistent with braking actions on the flat track at MP 17.

The locomotive engineer also revealed that he didn't observe Milepost 18 or CP 188, and that he mistook the signal at MP 19.8 for CP 188. He testified that his plan was to begin slowing at CP 188, so he ran full speed into MP 19.8 until he saw the permanent 30 MPH speed board where the train derailed.[17] The locomotive engineer's testimony also indicates that he did not have his track chart or Timetable open during the trip. Either of those items would have been invaluable tools for determining the train's location. Finally, the configuration of the monitor screens and the location of the speedometer of his unfamiliar locomotive, in non-PTC mode, created a distraction.

The locomotive engineer had only one single landmark to begin slowing down and that was CP 188. Having missed that landmark left him without any means to judge where the train was as it approached the speed restriction at the curve. CP 188, located at MP 18.8, provides several visual landmarks, most notably an Interstate on-ramp, which slopes dramatically down on the left immediately adjacent to the tracks. Nowhere is there a similar landmark. The locomotive engineer of

[15] See Locomotive Engineer's testimony p. 58, lines 19-24

[16] See Locomotive Engineers testimony p. 63, lines 2-8

[17] See Locomotive Engineer's testimony p.51, lines 2-21

Train No. 501 had lack of information and territorial familiarity to the extent that all other landmarks and distinguishing features were non-existent or irrelevant to him. His mark was CP 188 and he literally missed that mark by a mile.

In sum, there were numerous missed opportunities by various parties that contributed to the accident. Sound Transit and BNSF should have identified the curve at MP 19.8 as meeting FAST Act requirements; Amtrak managers and FRA Inspectors should have done the same. Amtrak should have provided the required training to the Conductors and more familiarization trips to the locomotive engineers. FRA should have regulated the number of familiarization trips required to qualify. The Washington Department of Transportation could have withheld approval to initiate revenue service until PTC was operational. Instead, these mistakes combined to permit a locomotive engineer to perform safety sensitive work on unfamiliar territory in an unfamiliar locomotive on his second trip ever, with only 180 seconds of experience on the severe grade at that location. There was, no safety redundancy because the conductor also wasn't qualified or trained well enough to know where the train was relative to the speed restriction. Even if he did know where the train was, the operating instructions didn't require the conductor to warn the locomotive engineer about the speed restriction because it wasn't in the timetable.

## Probable Cause

The Brotherhood of Locomotive Engineers and Trainmen concludes that the probable cause of the December 18, 2017 Amtrak Train No. 501 accident near DuPont, Washington was the Locomotive Engineer failing to slow the train for the permanent 30 MPH speed restriction at the curve located at MP 19.8 as a result of becoming confused as to his location. The train entered the 30 MPH curve at 78 MPH well in excess of the derailment speed for the geometry of the track.

## Contributing Factors

1. Both BNSF and Sound Transit failed to identify the need and requirement to include MP 19.8 in the timetable as a FAST Act zone. Both failed to include Amtrak Talgo trains in the same timetable requirement at MP 3.4. Sound Transit, and BNSF as their crew supplier, ensured that the timetable information over the territory they operated on was correct, but neither carrier made an effort to ensure the timetable provided the same degree of protection for the areas they did not operate on; specifically, that section between Lakewood and

Nisqually where Amtrak and Tacoma Rail did operate[18]. Amtrak alone, with its Talgo equipment, required new speed and instructions on the Subdivision, where it was operating for the first time; Tacoma Rail, operating at much slower speeds, had been provided for in Timetable #1 and Timetable #2 presented no operational changes for them.

2. Amtrak was not afforded the opportunity to review, edit, or critique the timetable prior to implementation.[19]

3. At least one (1) Amtrak manager in charge of qualifying train and engine crews over the Lakewood Subdivision did not notice the Timetable's Sounder-only requirement at MP 3.4, but did notice the omission of MP 19.8 from FAST Act requirements. However, they did not report this deficiency to Sound Transit or to Amtrak senior management, either entity could have issued instructions or orders including MP 19.8 under FAST Act requirements and including Amtrak under the same at MP 3.4.[20]

4. Federal Railroad Administration ("FRA") Inspectors who rode a test train on the Lakewood Subdivision days prior to the accident failed to notice that the speed restriction at MP 19.8 met FAST Act requirements, and yet was not included in the Timetable or General Orders.

5. Amtrak's qualification procedures were poor in both planning and execution. With the inherent distraction created by five (5) or more people in the locomotive cab at times simultaneously qualifying or observing, it is doubtful that any qualifiers acquired the degree of territorial familiarization required to operate a train over this territory safely. With Conductors "relegated to the rear," as one (1) Conductor testified, it is unlikely that they had any territory familiarity at all, and even had MP 19.8 been included under FAST Act requirements, that lack of familiarity may very well have prevented the Conductor from recognizing where the train was and calling attention to the restriction one (1) mile in advance as the Act requires. Crew training was "rushed and inadequate,". Amtrak has since modified their route qualification plans without input or consultation from either of the operating crafts representatives. (BLET or SMART).

6. Amtrak further impeded the route familiarization of the qualifying Locomotive Engineers by simultaneously implementing a new design of locomotive, the Siemens' Charger SC-44. One Amtrak manager stated that some Locomotive Engineers became qualified on both the territory and the locomotive <u>in the same trip</u>.[21] Locomotive Engineers were thus faced with both an unfamiliar territory and an unfamiliar locomotive at the same time, when their full attention should have been dedicated to learning the territory, its landmarks and features. The locomotive engineer's control stand contains (3) three display screens; locomotive data on the left, the PTC screen in the middle, and the speedometer and air gauges on the right. With PTC not operational on the Subdivision, the center screen was

[18] See Sound Transit Lakewood Subdivision Rail Activation Team interview pages 41-43, lines 24 &25, 1-5, and 5-12 respectively.

[19] See Sound Transit Lakewood Subdivision Rail Activation Team page 26, lines 22-25.

[20] See Amtrak Road Foreman Beatson interview page 28, lines 1-10.

[21] See Amtrak Assistant Superintendent J. Greenwell interview page 13, line 14.

blank. Normally, speedometers on locomotives are placed directly in front of the windshield. The placement on the Charger was to the far right, requiring the Locomotive Engineer to shift his attention from the track to the right side of the console repeatedly. Had PTC been operational, the center screen not only would have provided a readout of speed in the locomotive engineer's line of sight, but also would have made observing the right hand screen less important as the PTC overlay would have prevented an over speed condition in the first place. The screen placement of the Charger locomotive does not seem to foster greater focus on the track, signals, and signage ahead. Apparently, the Charger locomotive was designed to operate where PTC is in effect.

7. The training provided to the Locomotive Engineer of Train No. 501 on the Siemens' Charger locomotive was not comprehensive or thorough enough to prepare him to recognize, and accurately respond to, the over speed alarm. When the alarm sounded, the Locomotive Engineer, never having heard that particular alarm before, became fixated on his computer display to determine if the alarm stemmed from an over speed warning or a penalty brake application due to an over speed event, the former preceding the latter.

8. While all Amtrak managers interviewed after the accident expressed the opinion that Locomotive Engineers could take as many trips as they felt they required to feel comfortable, it seems clear that the intention was to limit everyone to one (1) round trip only due to time constraints. If so, this places productivity ahead of safety. The industry has seen the disastrous impact such a culture can have on a community as we witnessed in the Metro North series of accidents a few years back. In that era productivity was placed ahead of safety with catastrophic consequences. We are not convinced that a safety culture exists in Amtrak which would allow an uncomfortable employee to ask for more training without being subjected to personal or professional criticism and scrutiny, silent or overt.

## PROPOSED RECOMMENDATIONS

### To National Railroad Passenger Corporation ("Amtrak"):

1. Implement operating practices requiring Locomotive Engineers to have a minimum of six (6) round trips operating the controls of a locomotive for territorial qualifications where track speed exceeds 20 MPH, where territories have grades exceeding 1.8% and/or locations that trigger FAST Act requirements.

2. Implement operating practices requiring conductors to have a minimum of four (4) round trips in the control cab of the operating locomotive for territory qualifications where track speed exceeds 20 MPH, where territories have grades exceeding 1.8% and/or locations that trigger FAST Act requirements.

3. Revise the route qualification plans including participation from the Labor groups (BLET and SMART).

4. Ensure all lead locomotives allow a Locomotive Engineer to observe speed and air gauges with a minimum of eye movement so as not to divert their vision unnecessarily away from the track ahead.

5. Require that all new locomotives be equipped with a Heads-Up Display that displays, at a minimum, train speed and Brake Pipe Pressure onto the windshield in front of the Locomotive Engineer.

6. Review Amtrak's Safety Program and include definitive and absolute requirements that Amtrak Managers and Officials use the same process to report unsafe conditions and concerns that are utilized by scheduled employees. Further, require all frontline managers to perform observations designed to identify unsafe conditions for reporting.

7. Review all Timetables and instructions governing Amtrak operations to determine whether all locations having FAST Act requirements have been identified and included.

8. Provide all Conductors a means to determine the location and speed of their train that does not require them to visually observe landmarks.

## To Sound Transit:

1. Ensure all future Timetables are reviewed by all parties who will be subject to them prior to becoming effective.

2. Ensure all trackside signs are present, located correctly, and maintained in good condition.

3. Install and maintain a "Crest of Grade" sign at MP 3.4 for northward movement and at MP 19 for southward movement to remind train crews of the significant grade change.

4. Include MP 19.8 as a FAST Act area in Lakewood Subdivision Timetables.

5. Include MP 3.4 as a FAST Act requirement for Amtrak's Talgo trains.

## To the Federal Railroad Administration ("FRA"):

1. Implement regulations requiring locomotive engineers to have a minimum of six (6) round trips operating the controls of a locomotive for territorial qualifications where track speed exceeds 20 MPH, where territories have grades exceeding 1.8% and/or locations that trigger FAST Act requirements.

2. Implement regulations requiring conductors to have a minimum of four (4) round trips in the control cab of the operating locomotive for territory qualifications where track speed exceeds 20 MPH, where territories have grades exceeding 1.8% and/or locations that trigger FAST Act requirements.

3. In order to differentiate between territory qualification and territory familiarity, formulate regulations requiring Locomotive Engineers with fewer than twenty (20) round trips on any territory with grades exceeding 1.8% and/or triggering FAST Act requirements have a second, qualified crewmember in the cab before proceeding over those areas.

4. Require that railroad managers and officials actively participate in, and report safety concerns to, the same safety program used by scheduled employees.

5. Review all Timetables and instructions governing any and all passenger operations to determine whether all locations having FAST Act requirements have been identified and included.

## To Burlington Northern Santa Fe ("BNSF"):

1. Ensure all future Timetables are reviewed by all parties who will be subject to them prior to becoming in effect.

## To Washington Department of Transportation ("WSDOT"):

1. Utilize Rail Inspectors when planning and executing new and future rail service and improvements to ensure full compliance with all applicable rules and regulations.

2. Do not authorize new revenue passenger service until such time as the line segment has an operational PTC system deployed.

# CERTIFICATE OF SERVICE

***I certify that on December 7, 2018 I have electronically served upon Mr. Ted Turpin (turpint@ntsb.gov), Investigator in Charge, National Transportation Safety Board, a complete and accurate copy of these proposed findings regarding the December 18, 2017, derailment of Amtrak 501 near DuPont, Washington (NTSB Docket No. RRD-18MR001). An electronic copy of same was also forwarded to the individuals listed below in this certificate of service, as required by 49 CFR § 845.27 (Proposed Findings).***

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c/o Mr. Ted Turpin
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Mr. Michael Sturges
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Mr. Paul Aichholzer
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Mr. Ron Pate
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Mr. Antonio Perez
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***Sincerely yours,***

[redacted]

***Stephen J. Bruno***
***Brotherhood of Locomotive Engineers & Trainmen***
***National Secretary Treasurer***
***National Chairman, Safety Task Force***
***7061 East Pleasant Valley Road***
***Independence, OH 44131***

**Attachment A**

SOUNDTRANSIT

# Sounder Commuter Rail

## Timetable No. 2

In Effect at 0001
Pacific Continental Time
**November 13, 2017**

**Commuter Rail**
**Transportation Superintendent**
Weylin Doyle
Sounder Commuter Rail
Operations Department

**Commuter Rail**
**MW Superintendent**
Brandon Gatliff
Sounder Commuter Rail
Operations Department

| SOUTHWARD ↓ | Length of Siding (Feet) | Station Nos. | Mile Post | Lakewood Subdivision MAIN LINE STATIONS | Rule 4.3 | Type of Oper. | Line Segment | Miles to Next Stn. | ↑ NORTHWARD |
|---|---|---|---|---|---|---|---|---|---|
| Adjoining RR: BNSF, Seattle Sub<br>Subdivision Boundary: Lakewood MP 0.7 / Seattle MP 38.3X<br>Information for TR Jct is found in the BNSF Seattle Sub timetable. | | | | | | | | | |
| | | | 0.7 | TR JCT<br>Adj RR: BNSF, MP 0.7 | J | CTC | | 0.4 | |
| | | | 1.1 | PORTLAND AVE. | X(2) | | | 0.3 | |
| | | | 1.4 | L STREET | X | CTC<br>2 MT | | 0.5 | |
| | | | 1.9 | TACOMA DOME | | | | 0.1 | |
| | | | 2.0 | CP TACOMA DOME | X | | | 2.0 | |
| | | | 4.0 | CP 40 | | | | 2.3 | |
| | | | 6.3 | CP 63 | | CTC | | 0.1 | |
| | | | 6.4 | SOUTH TACOMA | | | | 0.1 | |
| | | | 6.5 | CP 65 | | | 324 | 0.4 | |
| | | | 6.9 | MANITOU | | | | 2.1 | |
| | | | 9.0 | CENTURY | B | | | 0.4 | |
| | | | 9.4 | PRAIRIE JCT | X | | | 0.5 | |
| | | | 9.9 | CP 99<br>(MT2) | | CTC<br>2 MT | | 0.2 | |
| | | | 10.1 | LAKEWOOD | | | | 0.1 | |
| | | | 10.2 | CP LAKEWOOD<br>(MT2) | | | | 0.5 | |
| | | | 10.7 | RILL | | | | 8.1 | |
| | | | 18.8 | CP 188 | | CTC | | 20.6 | |
| Adjoining RR: BNSF, Seattle Sub<br>Subdivision Boundary: Lakewood MP 21.3 / Seattle MP 24.5<br>Information for Nisqually is found in the BNSF Seattle Sub timetable. | | | | | | | | | |

**Pacific Continental Time in effect on Lakewood Subdivision**

| Radio Call-In | |
|---|---|
| **Radio Channel 087 in service TR Jct to Lakewood** | |
| Tacoma - 43(X) | Steilacoom - 52(X) |
| Nisqually - 50(X) | |
| **Emergency - Call 911** | |
| Dispatcher X=0, Mechanical Desk X=2, Customer Support X=3, RailRoad Police X=4, Detector Desk X=5, PTC Desk X=9 | |

**Dispatcher Information**

BNSF—(817) 867-7075, Fax (817) 352-7025

**1. Speed Regulations**

See Item 1 of the BNSF System Special Instructions for additional speed restrictions.

**1(A). Speed—Maximum**

| Main Track | Talgo | Psgr | Frt | |
|---|---|---|---|---|
| | | | Under 100 TOB | 100 TOB & Over |
| MP 0.7 to MP 10.7 | 79 | 60 | 40 | 40 |
| MP 10.7 to MP 21.3 | 79 | 79 | 40 | 40 |

**Temperature Restrictions**

Contact the train dispatcher if in doubt of the temperature. Notify the train dispatcher when the train is restricted.

| | | | | |
|---|---|---|---|---|
| 90 to 95 degrees F | 70 | 70 | -- | -- |
| 96 to 100 degrees F | 60 | 60 | -- | -- |

If the temperature exceeds the range in the chart above, the Sound Transit MW contractor or Sound Transit MW Superintendent will determine if further restrictions are necessary and issue a track bulletin.

**1(B). Speed—Permanent Restrictions**

Southward

| | Talgo | Psgr | Frt |
|---|---|---|---|
| MP 0.7 to MP 1.1 | 30 | 30 | 20 |
| MP 1.1 to MP 2.0 | 35 | 35 | 20 |
| MP 2.0 to MP 3.4 | 35 | 35 | 20 |
| MP 3.4 to MP 3.8 | 45 | 45 | 35 |
| MP 4.1 to MP 4.4 | 75 | 60 | 40 |
| MP 6.9 to MP 7.3, MT2 | 60 | 60 | 40 |
| MP 8.8 to MP 9.6, MT2 | 79 | 60 | 25 |
| MP 9.6 to MP 9.9, MT2 | 60 | 55 | 25 |
| MP 9.9 to MP 10.7, MT2 | 79 | 60 | 25 |
| MP 14.4 to MP 14.7 | 79 | 70 | 40 |
| MP 16.3 to MP 17.2 | 79 | 68 | 40 |
| MP 17.2 to MP 18.5 | 79 | 75 | 40 |
| MP 18.9 to MP 19.8 | 79 | 79 | 10 |
| MP 19.8 to MP 19.9 | 30 | 30 | 10 |
| MP 19.9 to MP 21.3 | 42 | 35 | 10 |

Northward

| | | | |
|---|---|---|---|
| MP 21.3 to MP 19.9 | 42 | 35 | 35 |
| MP 19.9 to MP 19.8 | 30 | 30 | 25 |
| MP 18.5 to MP 17.2 | 79 | 75 | 40 |
| MP 17.2 to MP 16.3 | 79 | 68 | 40 |
| MP 14.7 to MP 14.4 | 79 | 70 | 40 |
| MP 10.7 to MP 9.9, MT2 | 79 | 60 | 25 |
| MP 9.9 to MP 9.6, MT2 | 60 | 55 | 25 |
| MP 9.6 to MP 8.8, MT2 | 79 | 60 | 25 |
| MP 8.8 to MP 8.2, MT2 | 79 | 60 | 25 |
| MP 8.2 to MP 6.9, MT1 | 79 | 60 | 30 |
| MP 8.2 to MP 7.3, MT2 | 79 | 60 | 30 |
| MP 7.3 to MP 6.9, MT2 | 60 | 60 | 30 |
| MP 4.4 to MP 4.1 | 75 | 60 | 40 |
| MP 3.8 to MP 3.4 | 45 | 45 | 35 |
| MP 3.4 to MP 2.0 | 35 | 35 | 10 |
| MP 2.0 to MP 1.1 | 35 | 35 | 20 |
| MP 1.1 to MP 0.7 | 30 | 30 | 20 |

**1(C). Speed—Sidings, Main Track Switches and Turnouts**

Trains and engines must not exceed 10 MPH through turnouts unless otherwise indicated. Trains and engines using sidings must not exceed the siding turnout speed unless otherwise indicated.

| | Talgo | Psgr | Frt | |
|---|---|---|---|---|
| | | | Under 100 TOB | 100 TOB & Over |
| MP 1.4, L Street, crossover turnouts | 35 | 35 | 20 | 20 |
| MP 2.0, Tacoma Dome, crossover turnouts | 25 | 25 | 10 | 10 |
| MP 6.9, Manitou, turnout | 50 | 50 | 40 | 40 |
| MP 9.4, Prairie Jct, crossover turnouts | 50 | 50 | 40 | 40 |
| MP 10.7, Rill, turnout | 50 | 50 | 40 | 40 |

**1(D). Speed—Other**

Trains and engines must not exceed 10 MPH through turnouts unless otherwise indicated. Trains and engines must not exceed 10 MPH on other than main track (GCOR/MWOR 6.28) unless otherwise indicated.

| | | | | |
|---|---|---|---|---|
| Century Yard, MP 9.0, all tracks | 5 | 5 | 5 | 5 |

**2. Bridge and Equipment Weight Restrictions**

**Maximum Gross Weight of Car**
TR Jct to Nisqually ..... 143 tons, Restriction

Six axle locomotives and six-axle derricks are not permitted in the following locations:

| Location | Track Name | Track No. |
|---|---|---|
| Lakeview Industrial Park | All tracks | |

**3. Type of Operation**

| Main Track | |
|---|---|
| MP 0.7 to MP 1.0 | CTC |
| MP 1.0 to MP 2.0 | CTC, 2 MT |
| MP 2.0 to MP 6.9 | CTC |
| MP 6.9 to MP 10.7 | CTC, 2 MT |
| MP 10.7 to MP 21.3 | CTC |

All track not included in this table is governed by GCOR/MWOR 6.28.

**4. Subdivision Specific Rules Information**

**GCOR Rule 1.3.2, General Orders**—Supplemental information: Sound Transit commuter train schedules will be specified by BNSF Northwest Division General Notice.

**GCOR Rule 1.47, Duties of Crew Members**— Supplemental instructions: The Lakewood Subdivision is a Crew Focus Zone for passenger trains only.

When passing a signal which may require a train to stop at the next signal or pass the next signal at restricted speed, the engineer must make the following radio transmission to a designated member of the train crew and receive an acknowledgement:

- Train Identification (initials, engine number, and direction)
- Signal Name
- Signal/ Control Point location
- Track designation if on multiple main tracks

If acknowledgement is not received, the engineer must determine, at the next scheduled stop, why the transmission was not acknowledged. If the engineer fails to control the train movement in accordance with either a wayside signal or other restrictions imposed upon the train, the designated crew member shall at once communicate with and caution the engineer regarding the restriction. If necessary, the designated crew member must take appropriate action to ensure the safety of the train, including stopping all movement.

Example of Engineer's Transmission:
"SDRX 901 West approach signal CP 63, over."

Example of Conductor's Transmission:
"SDRX 901 West approach signal CP 63, FOCUS, out."

Crew Focus Zone requirements continue to apply until the signal indication is more favorable than a signal that requires the train to be prepared to stop at the next signal or pass the next signal at restricted speed. During a Crew Focus Zone condition, crew communication not related to train movement is prohibited. If a transmission, including one from the train dispatcher, occurs during a Crew Focus Zone condition, the crew must request that the transmitter stand by until the above information is communicated and acknowledged.

When Sounder passenger trains are operated with engineer solely occupying the control compartment, the conductor and engineer must communicate by radio any restrictions that affect the safe operation of the train, including Form A and Form B track bulletins, etc. In addition, permanent speed restrictions must be communicated at the following location:

Northbound: MP 3.4

Communication must occur not less than 1 mile from the required restrictions. Conductor must take appropriate action to ensure the safe operation of the train if engineer fails to acknowledge the restriction.

**GCOR Rule 5.8.1, Ringing Engine Bell**—Supplemental instructions: Passenger trains must ring engine (or control car if on leading end of movement) bell approaching and passing a passenger platform.

**GCOR Rule 5.8.2**—Supplemental instruction: Automatic Horn System (AHS).

The AHS is activated by an approaching train and will sound a wayside horn in conjunction with the automatic crossing devices at equipped crossings.

An AHS signal indicates the status of a wayside horn as viewed by a train approaching an equipped crossing.

Whistle signal 5.8.2(7) must be sounded if the wayside horn indicator is not visible from the point at which rule 5.8.2(7) requires the whistle to be sounded.

AHS is in service at the following crossing locations:

| Location | Milepost | Crossing Name |
|---|---|---|
| Tacoma | 2.36 | South C Street |
| | 5.9 | South 50th Street |
| | 6.28 | South 56th Street |
| | 6.52 | South 60th Street |
| | 7.37 | South 74th Street |
| Lakewood | 9.06 | 100th Street SW |
| | 9.56 | South 108th Street |
| | 10.40 | Bridgeport Way |
| | 10.91 | Clover Creek Drive SW |
| | 12.79 | North Thorn Lane SW |
| | 13.70 | Berkeley Street SW |
| DuPont | 17.34 | Barksdale Ave. |

**GCOR 5.10, Markers**—Supplemental instruction: Engines of passenger trains, when so equipped, must have red markers illuminated when engine is in trailing position.

**GCOR 5.10.1, Highly Visible Markers**—Supplemental instruction: Engines of passenger trains, when in trailing position, must not use the trailing headlight as a marker except when engine is not equipped with red markers or the red markers cannot be illuminated.

**GCOR/MWOR 6.19**—When flagging is required, distance will be 1.0 mile.

**GCOR/MWOR 6.26, Use of Multiple Main Tracks**—Between MP 0.7 to MP 1.0 there is no MT1. Track between these mileposts is designated MT2.

**GCOR Rule 6.32**—Supplemental instruction: Crossing Signal Wait Sign.


Trains and engines on other than the main track where a crossing signal wait sign is displayed must stop before occupying the crossing when automatic crossing signals are activated and wait 20 seconds before proceeding.

**GCOR Rule 9.9 Train Delayed Within a Block, B. CTC or Manual Interlocking Limits**—When a passenger train stops or reduces speed below 10 MPH the train must proceed at a speed not exceeding 40 MPH, prepared to stop at the next signal until the next signal is visible and that signal displays a proceed indication.

**GCOR Rule 10.2**—The following switches are not equipped with electric locks:

| Location | Track Name | Track No. |
|---|---|---|
| MP 4.5 | MR PJ Stub | 449 |

**GCOR Rule 15.1, Track Bulletins**—Trains operating on the Lakewood Subdivision must obtain a General Track Bulletin that includes Sounder Commuter Rail Lakewood Subdivision before leaving initial station.

General Track Bulletins must be issued to Sound Transit commuter trains a minimum of one hour before the equipment is due to leave Century yard en route to the initial station or before the train is due to leave the initial station if the equipment will be at the initial station when the crew comes on duty. If general track bulletins are not available 45 minutes before leaving time at the initial station, a crew member must contact the train dispatcher. If general track bulletins are not available 35 minutes before leaving time at the initial station, a crew member must contact BNSF Passenger Operations Desk at (800) 871-0902.

5. **Trackside Warning Detectors (TWD)**—None.

6. **FRA Excepted Track**—None.

7. **Special Conditions**

**TR Jct. and Nisqually**—BNSF operating rules and BNSF Seattle Subdivision Timetable are in effect within CTC control points at TR Jct. and Nisqually.

**MP 2.0 (Tacoma Dome) to MP 3.4 (Hilltop), Occupied Block**—Only one movement is permitted between MP 2.0 and MP 3.4 (Hilltop) at any time except the train dispatcher may authorize movement of an engine to assist a stalled train. After receiving permission from the train dispatcher, a stalled train may back down to Tacoma Dome when necessary. Reverse movement must be directed by a qualified employee from the leading car of movement. The engineer will apply sand to the rails as the train descends.

**MP 2.0 (Tacoma Dome) to MP 3.4 (Hilltop), Freight Trains**—Freight trains are prohibited between MP 2.0 and MP 3.4 (Hilltop) except train dispatcher may authorize light engine or maintenance of way train movements as directed by Sound Transit Commuter Rail Transportation Superintendent.

**MP 2.0 (Tacoma Dome) to MP 3.4 (Hilltop), Sound Transit Commuter Trains**—Sound Transit commuter trains should have a locomotive at the south end of the train between MP 2.0 and MP 3.4 (Hilltop). If it is necessary to operate with a locomotive at both ends or at the north end of the train, instructions relating to the control car will apply to the locomotive at the north end of the train.

**MP 2.0 (Tacoma Dome) to MP 3.4 (Hilltop), Mountain Grade Operation**—Air Brake and Train Handling Rules for mountain grade operation apply on mountain grade between MP 2.0 and MP 3.4 (Hilltop), ruling grade ascending south is 2.8%.

**MP 2.0 (Tacoma Dome) to MP (Hilltop), Recovery after Emergency Brake Application**—Sound Transit commuter trains recharging the brake system after an emergency application:

Ascending Trains:
- Apply engine independent brake and 100% of car handbrakes.
- Engineer must remain in the locomotive cab.
- Release the automatic brake.
- Recharge the air brake system.
- When air is recovered, make a sufficient brake pipe reduction to hold the train while handbrakes are released. Release handbrakes beginning with the first car and working back.

Descending Trains:
- Train crew member will apply the engine handbrake and 100% of car handbrakes.
- Release the automatic brake.
- Recharge the air brake system.
- When air is recovered, make a sufficient brake pipe reduction to hold the train while handbrakes are released. Release handbrakes from engine toward cab car.

**MP 4.92, Dimensional Equipment restriction**—equipment exceeding 22 feet 00 inches in height is prohibited at MP 4.92 due to overhead bridge clearance. Employees are prohibited from riding on top of equipment when approaching or passing this overhead bridge location.

**MP 10.1 (Lakewood) and MP 3.4 (Hilltop), Running Brake Test**—Northward passenger and commuter trains that will operate north of MP 3.4 (Hilltop) must make a running brake test between MP 10.1 (Lakewood) and MP 3.4 (Hilltop).

- Make a minimum reduction brake application.
- If train is not braking with normal retardation, stop the train with an emergency application.
- After the train stops, inspect the entire train for the cause of the braking failure, particularly snow or ice buildup on wheels, brake rigging or rails. If the problem cannot be corrected, notify the train dispatcher to request assistance.
- After completion of the running brake test, the brake system must be fully recharged before passing MP 3.4 (Hilltop).

**Close/No Clearance Location(s)**

| Location | Track Name | Track No. | Obstruction |
|---|---|---|---|
| Ft. Lewis | Cantonment | | |

**Long/Short Miles**

MP 1 - MP 2 5,265 feet
MP 9 - MP 10 5,275 feet
MP 10 - MP 11 5,278 feet

**Test Miles**

MP 2 - MP 3
MP 3 - MP 4
MP 4 - MP 5
MP 5 - MP 6
MP 6 - MP 7
MP 7 - MP 8
MP 8 - MP 9

**Flash Flood Critical Areas**—None

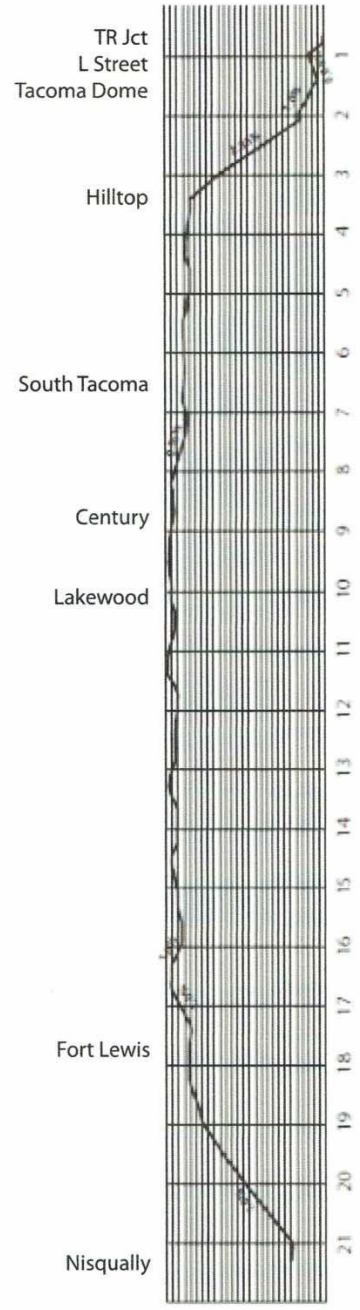
**8. Line Segments**

| Segment No. | Limits | Mile Posts |
|---|---|---|
| **Road Line Segments** | | |
| 324 | TR Jct to Nisqually | |

**9. Other Location Information**

| Name | Mile Post | Capacity in Feet | Switch Opens |
|---|---|---|---|
| Hilltop | 3.4 | N/A | N/A |
| Century Layover Yard | 9.0 | Yard | Both |

**10. Grade Chart**



**Speed Tables**

| SPEED TABLE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time Per Mile | | Miles Per Hour | Time Per Mile | | Miles Per Hour | Time Per Mile | | Miles Per Hour |
| Min. | Sec. | | Min. | Sec. | | Min. | Sec. | |
| - | 36 | 100 | - | 58 | 62.1 | 1 | 40 | 36.0 |
| - | 37 | 97.3 | - | 59 | 61.0 | 1 | 42 | 35.3 |
| - | 38 | 94.7 | 1 | - | 60.0 | 1 | 44 | 34.6 |
| - | 39 | 92.3 | 1 | 02 | 58.0 | 1 | 46 | 34.0 |
| - | 40 | 90.0 | 1 | 04 | 56.2 | 1 | 48 | 33.3 |
| - | 41 | 87.8 | 1 | 06 | 54.5 | 1 | 50 | 32.7 |
| - | 42 | 85.7 | 1 | 08 | 52.9 | 1 | 52 | 32.1 |
| - | 43 | 83.7 | 1 | 10 | 51.4 | 1 | 54 | 31.6 |
| - | 44 | 81.8 | 1 | 12 | 50.0 | 1 | 56 | 31.0 |
| - | 45 | 80.0 | 1 | 14 | 48.6 | 1 | 58 | 30.5 |
| - | 46 | 78.3 | 1 | 16 | 47.4 | 2 | - | 30.0 |
| - | 47 | 76.6 | 1 | 18 | 46.1 | 2 | 05 | 28.8 |
| - | 48 | 75.0 | 1 | 20 | 45.0 | 2 | 10 | 27.7 |
| - | 49 | 73.5 | 1 | 22 | 43.9 | 2 | 15 | 26.7 |
| - | 50 | 72.0 | 1 | 24 | 42.9 | 2 | 30 | 24.0 |
| - | 51 | 70.6 | 1 | 26 | 41.9 | 2 | 45 | 21.8 |
| - | 52 | 69.2 | 1 | 28 | 40.9 | 3 | - | 20.0 |
| - | 53 | 67.9 | 1 | 30 | 40.0 | 3 | 30 | 17.1 |
| - | 54 | 66.6 | 1 | 32 | 39.1 | 4 | - | 15.0 |
| - | 55 | 65.5 | 1 | 34 | 38.3 | 5 | - | 12.0 |
| - | 56 | 64.2 | 1 | 36 | 37.5 | 6 | - | 10.0 |
| - | 57 | 63.2 | 1 | 38 | 36.8 | 12 | - | 5.0 |

| FEET | TENTHS OF A MILE |
|---|---|
| 528 | .1 |
| 1,056 | .2 |
| 1,584 | .3 |
| 2,112 | .4 |
| 2,640 | .5 |
| 3,168 | .6 |
| 3,696 | .7 |
| 4,224 | .8 |
| 4,752 | .9 |

# TERMSDXO

T - Trains
E - Engines
R - Railroad cars
M - Men & equipment fouling track
S - Stop signal
D - Derail or switch lined improperly
X - Crossings at grade
O - Other crew movements

## Remember "TERMSDXO" when shoving cars

To assist in determining where to start sounding the whistle as described in Whistle Signal 7, use the following:

At the speed indicated in the left column, wait the time indicated in the right column before sounding the whistle.

| Train Speed | Delay to Sound Whistle |
|---|---|
| 40 MPH | 3 seconds |
| 35 MPH | 6 seconds |
| 30 MPH | 10 seconds |
| 25 MPH | 16 seconds |
| 20 MPH | 25 seconds |
| 15 MPH | 40 seconds |
| 10 MPH | 1 minute 10 seconds |

## GCOR 4.3 Timetable Characters, Supplemental Instruction

| | |
|---|---|
| A | Automatic Interlocking |
| B | General orders, notices, and circulars |
| C | Radio communication |
| g | Gate, normal position against conflicting route |
| G | Gate, normal position against this subdivision |
| J | Junction |
| M | Manual interlocking |
| P | Telephone |
| R | Restricted Limits |
| S | Railroad crossing protected by permanent stop sign |
| T | Turning facility |
| U | Railroad crossing not protected by signals or gates |
| X | Crossover |
| X(2) | Multiple crossovers |
| Y | Yard Limits |

# Attachment B

**HR 22**

One Hundred Fourteenth Congress of the

United States of America

**AT THE FIRST**

**SESSION**

***Begun and held at the City of Washington on Tuesday, the sixth day of January, two thousand and fifteen***

## An Act

To authorize funds for Federal-aid highways, highway safety programs, and transit programs, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

**SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

(a) SHORT TITLE.—This Act may be cited as the ''Fixing America's Surface Transportation Act'' or the ''FAST Act''.



**SEC. 11406. SPEED LIMIT ACTION PLANS.**

(a) IN GENERAL.—Not later than 90 days after the date

of enactment of this Act, each railroad carrier providing intercity rail passenger transportation or commuter rail passenger transportation, in consultation with any applicable host railroad carrier, shall survey its entire system and identify each main track location where there is a reduction of more than 20 miles per hour from the approach speed to a curve, bridge, or tunnel and the maximum authorized operating speed for passenger trains at that curve, bridge, or tunnel.

(b) ACTION PLANS.—Not later than 120 days after the date that the survey under subsection (a) is complete, a railroad carrier described in subsection (a) shall submit to the Secretary an action plan that—

(1) identifies each main track location where there is a reduction of more than 20 miles per hour from the approach speed to a curve, bridge, or tunnel and the maximum authorized operating speed for passenger trains at that curve, bridge, or tunnel;

(2) describes appropriate actions to enable warning and enforcement of the maximum authorized speed for passenger trains at each location identified under paragraph (1), including—

(A) modification to automatic train control systems, if applicable, or other signal systems;

(B) increased crew size;

(C) installation of signage alerting train crews of the maximum authorized speed for passenger trains in each location identified under paragraph (1);

(D) installation of alerters;

(E) increased crew communication; and

(F) other practices;

(3) contains milestones and target dates for implementing each appropriate action described under paragraph (2); and

(4) ensures compliance with the maximum authorized speed at each location identified under paragraph (1).

(c) APPROVAL.—Not later than 90 days after the date on which an action plan is submitted under subsection (b), the Secretary shall approve, approve with conditions, or disapprove the action plan.

(d) ALTERNATIVE SAFETY MEASURES.—The Secretary may exempt from the requirements of this section each segment of track for which operations are governed by a positive train control system certified under section 20157 of title 49, United States Code, or any other safety technology or practice that would achieve an equivalent or greater level of safety in reducing derailment risk.

**APPENDIX C**

# AMTRAK

**Route Qualification Plan**

# Northwest Division

**Effective: 3/12/2018**

***Revised 7/16/18***

National Railroad Passenger Corporation's policy for Training and Qualifying Locomotive Engineers and Conductors on the route(s) they will operate over.

# Route Qualification Plan

Each Division will develop a Route Qualification Plan for each route they operate over. The Route Qualification Plan will be used to ensure that there is consistency when training Locomotive Engineers and Conductors over a new route or when a Locomotive Engineer or Conductor transfers to a new crew base. The Route Qualification Plan will be submitted to the System General Road Foreman for review and approval. All new routes must have the route qualification plan approved before commencing operations over the route. The route qualification plan must include:

1. The route name and total mileage.
2. Scheduled hours of operations over the route.
3. The segments for each route (should be 25 – 50 mile segments based on complexity). The minimum number of operating round trips that are required before an Engineer can get pre-qualified on the Segment. Engineers must be pre-qualified over each segment before a final qualifying ride over the entire route is done. Each segment's pre-qualification ride must be documented on an 1876.
4. The minimum number of operating round trips, over the entire route, for Engineers. At a minimum, an engineer will make four operating round trips over the entire route. If routine operation includes day and night train movements, engineers will make a minimum of two operating night trips and two operating day trips.
5. The number of head end observation trips for Conductors. Conductors must make a minimum of two round trip head end observation rides. This is to include at a minimum one night trip and one day trip. Conductors must also make a minimum of one in the body of the train round trip unless they have previously worked the route as an Assistant Conductor.

Seattle Crew Base

# Lakewood Sub

**Prepared by:** Bradasich

**Date:** April 4th, 2018

## Route Miles and Schedule:

| Route | Miles | Scheduled Hours of Operation |
|---|---|---|
| TR JCT-Nisqually | 20.6 | 0630 – 2200 |

## Conductor Ride Requirements:

| Route | Minimum Head End Trips for Conductor Qualification | Minimum in the Body of the Train Rides |
|---|---|---|
| TR JCT-Nisqually | 2 | 1 |

**Segments for the Route and the minimum Operating Trips required before getting Pre-Qualify on each Segment for Engineers**

| TR JCT-Nisqually | | |
|---|---|---|
| **Segment** | **Miles** | **Minimum Operating Round Trips** |
| TR JCT-Nisqually | 20.6 | 6 |

**Minimum Operating Round trips over the entire Route for Engineers: __6___**

**Operating Rules, Timetables and Signals required**

| Operating Rules | Timetables / Subdivision's | Signals |
|---|---|---|
| BNSF | Lakewood | BNSF |

**Timetable/Special Instructions Training**

| Training | Location | Trainer |
|---|---|---|
| Sound Transit<br>BNSF Timetable | SEA | Road Foreman/OJTI |

**Training Material Needed for PC Study**

Sound Transit General Orders, NW Summary General Order, Sound Transit Track Chart, BNSF TTSI

## Equipment Training Needed for Engineers

| Locomotive | Location | Trainer |
|---|---|---|
| Chargers, F59, P32,40,42, Talgo Series 8 Cabcar, NPCU | SEA | Road Foreman/OJTI |

**Maintaining Records**

Records that can be maintained electronically will be placed on the shared drive. Hard copies will be maintained in the Road Foreman Trainers office.